

by penning sheep and cattle on it for several nights. Then the light plough is drawn over it, once lengthwise and once across, about two feet apart. Where two furrows cross the seedlings are planted and watered from a pot whenever the weather keeps fair for more than a day or two. After a fortnight a little dung is put to each plant and the field is hoed with a scalping knife. This hoeing has to be repeated several times to keep the soil open and powdered. At the end of about six weeks the top shoots are pinched off, and the pinching is repeated several times after. In December or January when it begins to whiten, the tobacco is fit for cutting. The stems are cut within two or three inches of the ground and are then split lengthwise, and the halves strung in a line and spread to the sun and air for twenty days, being turned every third day. After this the leaves are taken into the house, piled in a heap, covered with straw, and pressed with a large stone, and turned every fourth day. After this pressing and turning has been repeated four or five times the tobacco is fit for sale. Tobacco is generally grown every third year. In Chikodi and Athni, at a cost at £2 5s. (Rs. 22½), the acre yield in a good season is 420 pounds, but over a series of several years the average outturn is probably not more than 280 pounds. This at 5s. to 6s. (Rs. 2½ - 3) for twenty-eight pounds brings to the husbandman from £2 10s. to £3 (Rs. 25 - 30) or a net acre profit of 5s. to 10s. (Rs. 2½ - 5).

Cotton,¹ covering 91,407 acres or 9·66 per cent of the tillage area, is the most valuable and next to Indian millet the largest crop grown.

As cotton-growers the different sub-divisions of Belgaum come in the following order, Parasgad, Athni, Sampgaon, Gokák, Chikodi, Belgaum, and Khánápur.² The soil, roads, climate, and position of Sampgaon fit it to hold the first rank among the Belgaum cotton-growing tracts. The reason why it holds the third place is that its nearness to the Belgaum market makes grain pay better than cotton. As regards climate the Belgaum cotton plain has two great advantages. Its 1500 to 2000 feet above the sea keeps it comparatively cool, and the two fairly light monsoons in which it shares prevent the air from growing excessively dry, save the roots from being rotted with damp, and help the under-soil to keep moist far into the hot weather. In the cotton plains of Belgaum the average yearly rainfall for the twenty-three years ending 1882 varied from seventeen to twenty-three inches. Thermometer readings at Belgaum show a greatest heat of 101° in May and a least heat of 57° in December. Mr. Mercer, the American planter, who in 1840 travelled over a considerable part of India, noticed that the climate of the Bombay Karnatak was more like that of Mississippi than any climate he had experienced in India and that this had probably

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CROPS.
Tobacco.

Cotton.

¹ The account of Belgaum cotton is prepared from a pamphlet written by Mr. W. Walton, late superintendent of cotton gin factories and cotton improvements.

² In 1881-82 the areas under cotton in the different sub-divisions were, Parasgad 26,607 acres, Athni 24,258, Sampgaon 15,949, Gokák 13,784, Chikodi 9395, Belgaum 1405, and Khánápur 5 acres.

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CROPS.
Cotton,
Kinds.

much to do with the exceptional success of Mississippi seed in Belgaum and Dhárwár.¹

Three kinds of cotton are grown in Belgaum. *Gossypium arboreum* or *devkápús* (M.) that is God's Cotton, used in making sacred threads; *Gossypium indicum* or *juvári-hatti* (K.) that is country cotton; and *Gossypium barbadense* or *viláiti-hatti* (K.) that is foreign cotton. Of these three kinds *Gossypium arboreum*, a perennial bush growing ten to twelve feet high is much like the Peruvian or Brazilian cotton plant. It is raised in small quantities all over the district, both in the black eastern plains and close to the hilly forest-clad west. The cotton is white silky and of long staple, but too brittle to be used for ordinary purposes. It is never grown as a field plant and its wool never comes to market. Bushes are occasionally grown in gardens beside wells and streams and near temples. From the cotton of this plant Bráhmans make their sacred threads spinning it from a small reel called *bhirki*, temple servants make their lampwicks, and Bráhman and other high caste Hindu women spin it into thread for other purposes. *Gossypium indicum* or *juvári-hatti*, generally known as Kumta cotton, is largely planted everywhere. *Gossypium barbadense*, which is planted only sometimes and to a small extent in Parasgad and Sampgaon, is the American cotton which was introduced in 1845 by Government planters. Both Kumta and American cotton are grown as annuals.

Seed.

In former times great care was paid to the seed. Landholders, when their seed showed signs of losing strength, sent for a fresh supply from any part of the district where the crop was specially good. Of late years less care has been shown in the choice of seed, and the seed is also allowed to suffer from the practice of leaving the cotton unpicked after it is ripe. Showers fall and the damp seed tends to sprout and loses vigour. Cotton whose seed is meant for planting should be separately ginned. Separate ginning is necessary because seed for sowing should be as well preserved as possible, while the seed of cotton ginned for wool must be thoroughly dried in the sun before ginning. Seed for sowing must be kept in a dry and even temperature, and through the early rains must be often looked at and aired to check untimely sprouting. The people pay great care to the seed, keeping it in well covered dry earthenware pots, and taking it out and examining it every now and then until sowing time. It is easy to tell if cotton seed is good or is bad. Cut across it with a sharp knife and look at the kernel. If the seed is good the kernel is cream-coloured, moist, and speckled with little dark spots; if the seed is bad the kernel is a dirty yellow or brown and is shrivelled. In sending cotton seeds from one district or one country to another, especially by sea, the greatest care should be taken. The seed should

¹ Observations in the American cotton country between 30° and 34° north latitude and 78° and 96° west longitude show for eight towns in the more western tract (96°-90° west), a variation from 64° to 74° in means and from 47° to 87° in extremes, and for six places in the more eastern tract (82°-78° west) a variation from 57° to 72° in means, and from 42° to 83° in extremes.

be packed in a cool, dry, airy place, where the temperature is as even as possible. On board ship the parcels should when practicable be in cabins or rooms on deck. Stowing below hatches often does much mischief to cotton seed. Some German authorities go so far as to say that no seed can keep its life if packed in the hold below the ship's water-line. This is not the case, as instances are known in which seed so packed sprouted and gave a middling crop. Still great risk is run and serious harm is almost always caused. With the more delicate kinds of cotton it is best to send the seed with the wool, just as picked from the plant. No seed should ever be placed near a ship's engines or boilers.

In India for the growth of cotton, the soil should be loose and open enough to allow the air and sun to pass below the surface and still more to let excessive and untimely rain drain under the roots. These qualities the crumbling gaping soil of the deep black Belgaum plain has in an unusual degree. The black cotton soil, which the Kánarese husbandmen call *yera bhumi* (K.) or melted earth is of three classes, *regar* (Tel.) or pure black, a brown soil much like *regar* but geologically less matured and containing much disintegrated trap, and a gray black soil largely mixed with lime nodules and an underlayer of lime two to ten feet below the surface. The *regar* or pure black is best suited for the local cotton and the brown for the American cotton. The gray black is inferior to the other two, the staple being poorer and scantier. One great merit of the black and brown soils is the wonderful time the under-soil keeps moist. It is this underground dampness that enables the cotton plant to mature as late as March. When the surface is baked and gapes with the heat the cotton bushes are still green because the tap-roots are down in the cool moist under-soil. Cotton is seldom grown on red soil; the outturn is too small to pay at ordinary prices. Mr. D'Oyley, an assistant collector, once experimented with foreign cotton on red soil. He found the plants flourish so long as the rains lasted, but as soon as the dry weather set in they withered. Examination showed that the hardness of the soil had kept the roots from passing any distance below the surface.

Much interesting information was collected in 1855 as to the effect of watering cotton in Belgaum. Mr. Goldfinch, of the Civil Service, stated that water was considered unnecessary if not hurtful. Some New Orleans plants failed in watered land, while others thrived near at hand in the same soil without water. Mr. Seaton-Karr, of the Civil Service, had never seen cotton watered; he believed that watering would harm the plant. The late Colonel Meadows Taylor, C.S.I., who had paid close attention to the subject, condemned the watering of cotton. He tried several kinds at the same time some with and some without water. In all cases, except only with the Sea Island, watering was a failure. With Sea Island, up to a certain time, watering did good, but continued watering did harm. He thought that in deep black soils watering would always harm cotton, but in stony and shallow soil one or two judicious waterings might do good. In any case water should never be given after the 15th of December. He thought that the staple of watered

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cotton would always prove weaker than the staple of unwatered cotton. The husbandmen whom Colonel Taylor consulted had never tried irrigation and agreed with him in all essential points. The result of experiments in watering cotton in Belgaum was in red soil an outturn of cotton worth 2s. 6d. (Rs. 1½) at a cost of £1 0s. 8d. (Rs. 10½); in black soil an outlay of 11s. 10d. (Rs. 5½) yielded little more than half the quantity grown without water. Between 1845 and 1851, Mr. Channing, an American planter who was engaged by the East India Company and was sent by Government to Belgaum, made some experiments in red and clayey soils. He thought that in these soils water helped cotton, but it must be applied most carefully, after sunset and before sunrise and without wetting the leaves. He also held that the watered plants were more liable to blight and to injury from insects. In 1854, Mr. L. R. Ashburner, of the Civil Service, noticed that watering made cotton run to wood and seed and lessened the outturn of wool and weakened the staple. This view was supported by the American planters who declared that after the tap-roots had taken hold, soil and climate could hardly be too dry. In Dhárwār watering the cotton plants showed the same result. On one occasion, when want of rain threatened to destroy his crop, Mr. W. Shearer (1867-1875), the superintendent of cotton experiments, endeavoured to save it by watering. The watered plants yielded no more cotton than the unwatered plants, and the staple of the watered plants was exceptionally weak. So far as Mr. Shearer's experience went the only effect of watering either foreign or local cotton was to develop the plant at the expense of the fibre. Apart from the difficulty of keeping the plants in health during the whole of an ordinary hot season the annual cotton plant would seem to yield better cotton than the plant yields when it is allowed to remain in the ground for more than one season. In 1874, Mr. Walton, the superintendent of cotton gin factories in Belgaum, noticed that after a very heavy and late rainfall cotton was deficient in quantity and unusually weak in staple. At the beginning of the next rains the plants were so green that some landholders allowed them to stand till the next season. This attempt to make cotton perennial failed. In every place where it was tried the yield was very small, and the length and strength of the fibre much less than usual, while in the fields grown in the regular way, that is treating the plant as an annual, the crop was unusually large and good.

Change.

Mr. Mercer, an American planter, who was in Dhárwār between 1841 and 1846, came to the conclusion that, though poverty often prevented him from doing what was best, no one understood the benefit of a regular change of crops better than the Indian husbandman. On the other hand Dr. Wight maintained that in his rotation of crops the Indian husbandman was more governed by chance or caprice than by system. Mr. Walton's experience during the fifteen years ending 1880 satisfied him that Mr. Mercer's view was the correct view. The Belgaum husbandman, when well-to-do, is careful to change his crop according to regular rules. He knows that cotton takes much out of the soil, and, unless he is tempted by high prices, does not grow cotton oftener

than once in three years. Other circumstances besides a tempting price of cotton lead to the rule of rotation being broken. A landholder may make the proper field ready for cotton but the rain may be unsuitable for cotton and another crop may have to be sown. Cotton is one of the late, called *rabi* (M. and H.) or *hingári* (K.), crops. If rain falls well for the early crops the husbandman leaves less land than he ought for the late crops; if the early rain fails more land than he ought to leave is left for the late crops. Again as high cotton prices tempt the husbandman to grow more cotton than he ought to grow, so high grain prices tempt him to grow less cotton than he ought to grow. Still cotton is the husbandman's great money-bringing and rent-paying crop and he is always anxious to grow as much cotton as he can. Enquiries into the composition of cotton seem to show that the cotton or wool absorbs potash, lime, phosphoric acid, magnesia, and sulphuric acid, the proportions being about half of the whole potash, one-quarter lime, one-fifth phosphoric acid, and the greater part of the small remainder magnesia with a very little sulphuric acid. The total quantity absorbed is very small. It was calculated that some twelve pounds of the above ingredients were amalgamated in about two thousand pounds of cotton wool, so that the total quantity was only about one ounce to an acre. An analysis of the seed showed that the seed absorbed half as much again as the wool. Of ninety-six parts forty-five were phosphoric acid, thirty lime, twenty potash, and the small remainder sulphuric acid. No analysis of the plant is available.

Manure is not put on the ground in the same year in which the land is sown with cotton. The husbandmen say that fresh manure heats the soil too much for cotton; they therefore put on the manure the year before the cotton is sown. The manure is the pulverised produce of the manure-pit in which dung, cattle litter, house sweepings, fallen leaves, ashes, and rubbish of all sorts have been laid to rot. Three to six cart-loads of manure an acre are generally spread on the fields in the hot season (March-May) between thunder-showers. To this is added the burnt roots of the former crop and occasionally some quick-growing crop is raised and ploughed in.

The field tools used in growing cotton have been already described.

Mr. Mercer, the American planter (1841-1846), came to the conclusion that the system of growing cotton in the Kánarese country was not nearly so defective as was supposed. Many of the better class of husbandmen take great care in preparing their cotton land. It is cleared of all the stumps of the previous crop, partly by hand partly with the hoe or *kunti*. It is then ploughed either with the smaller or larger plough. The main object of working the large plough is not so much to turn the soil as to cut out the roots of weeds and wild plants, particularly the entangled and almost incredibly strong webs which the matted roots of *harrihalli* (M.) or *kariki* (K.) grass, *Cynodon dactylon*, form eight to twelve inches below the surface. Unless the *kariki*, which though hurtful as a weed is the best horse grass in the Karnátak, is cleared the cotton roots have no chance of striking into the subsoil and the

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plants rapidly wither as the moisture withdraws from the surface to the subsoil. Even repeated workings of the heavy plough are not always sufficient to remove the roots of this grass. After several ploughings the weeds have often to be destroyed by men going round separately and cutting and uprooting them with a bladed pick or *bái-kudali*. After the ground is cleared the hoe is used to break the clods, but these are often so large and stubborn that they have first to be roughly separated by a heavy beam of wood, locally called the *koradu* (K.), dragged by several pairs of bullocks. After the beam the hoe or *kunti* (K.) is used. Even this is sometimes not enough and the clods have to be softened by rain before it is possible to break them. Another effectual way is to break the land by manual labour. Large numbers of labourers turn out with pickaxes or *bái-kudalis* (K.) and dig the land often two feet deep. This is very slow and hard work, but the result repays the severe labour and expence. The soil thus broken and smoothed is ready for seed.

A point which was often urged by the American planters, and which has since been strongly recommended by many outsiders, is early sowing. It is often stated that Belgaum cotton has to pass through many hardships because the seed is not sown soon enough. No rule can be laid down as to the correct time for sowing. In each district the time depends on the rainfall. No cotton seed can be successfully sown until enough rain has fallen to bring the soil into proper condition for starting the seed. This condition of the earth is much better understood by the local husbandman than by any stranger. In 1860, Mr. Mansfield, who had long known the Kánarese country, drew the attention of Government to an advertisement of the Bombay Chamber of Commerce, in which people were advised to sow cotton in May and November. All persons who followed this advice would, Mr. Mansfield observed, inevitably lose both their seed and their labour. In May the Belgaum soil is much like cinders at a temperature of one hundred and fifty degrees; and, if sowing is delayed till November, the cotton has not time to ripen before the fierce sun forces open the half-ripe bolls.

Cotton is sown in August, early or late according to the rainfall, but generally in the latter part of the month. As a rule cotton-sowing begins in the west fully a fortnight before it begins in the east. This is owing to the difference in rainfall. In fact the eastern country has often to wait for what the Kánarese call the *muggi muli*, or return monsoon, that is rain from the east, before their land is in proper order for cotton and other late or *hingári* sowings. By the latter part of August the land has been thoroughly soaked, and is so far drained that the surface is comparatively dry. Land fairly dry on the surface with much moisture below is in the proper state for sowing cotton. It helps the seed to sprout and it draws the roots deep enough to support and bring the plant to perfection when the hot weather and trying east winds set in. Between the time of smoothing and of sowing the land the surface generally becomes more or less covered with weeds and grass. The husbandman easily removes these weeds with his hoe, and the hoeing also stirs the surface and makes it ready for the seed. The seeds are rubbed in

fresh bullock-dung and water, which gives them a hard smooth surface, prevents their sticking together, and enables them to run freely through the sowing drill. The rubbing with cowdung is also said to quicken and help the sprouting. The seed is sown with the aid of the seed-drill or *kurgi* (K.), which has two iron teeth as far apart as the distance between the two rows of cotton. To each of the teeth a hollow bamboo tube called *yellishedi* (K.) is fastened. Bullocks are yoked to the seed-drill, and as the drill moves the iron teeth plough two drills, and in these the cotton seed is dropped through the bamboo tube. Two rows are thus sown about eighteen inches apart. The seed-drill is immediately followed by the hoe which closes the drills. The seed-leaves show in six to twelve days. In about a month, when the plants are three or four inches high, the farmer takes his simple but effective grubber or *yedi-kunti* (K.), and works it between the cotton plants doing two rows at a time. The grubber roots out all young weeds and grass, and, at the same time, turns over the surface soil and prevents it from souring, and also heaps the soil at the roots of the young plants. This heaping of the soil is repeated several times, the oftener the better, until the plants grow too high. The more hardworking and careful husbandmen besides the grubber employ hand labour. For this men women and children are hired on 3d. to 6d. a day (2-4 as.), weeding at a surprising speed with a *kurchigi* or miniature sickle. By the middle of October hard cutting east winds set in which are very trying to the cotton plants. These east winds last fully a month, when the strain is eased by occasional genial westerly breezes, and sometimes by timely showers. Then easterly winds again set in, and with an occasional break blow more or less heavily, until January and sometimes February. Meanwhile the plants have flowered, and these steady east winds rapidly mature them and ripen the bolls, so that the crop is ready for a first picking late in February or early in March. A good crop yields five and sometimes six pickings; a poor crop not more than three or four. All the picking, and in the case of the local cotton all the ginning, is done by women and children, the labour of the men ceasing when the plants reach maturity. The main anxiety with cotton is to plant it so that it will be ripe and get picked when there is no danger of rain. This essential is too often overlooked by those who think that the Belgaum husbandman might sow his cotton earlier, and thus have it sooner ready for export. Experience has taught the people that by sowing in August the chances of success are greater than by sowing at any other time.

The payment of the cotton-pickers causes frequent disputes. When the price of the staple rules high the husbandman wishes to pay the women in cash. When the price of the staple is low he wishes to pay them in kind. The pickers know well how cotton is selling, and as their interests are the opposite of the husbandman's, disputes are common. When the crop is large labour is generally scarce, then the women strike in the most determined way, and generally make the owner of the cotton come to terms.¹ In America when

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Tillage.

¹ In 1850, according to Mr. Channing, the people were paid 1½d. (1 anna) for every

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it grows too freely the cotton plant is topped or pruned. This is done to prevent the plant running to wood and leaf and to make it flower and fruit. Belgaum cotton plants are never pruned. During the fifteen years ending 1880 only in the heavy rains of 1874 did the plants grow to any great size. Even then they were no larger than the usual height in America. European agriculturists, both practical and amateur, have often remarked upon and condemned the crowded way in which the people of Belgaum grow their cotton. In this, to a considerable extent, the people are right. That at times they overcrowd the plants is true. Still in so dry a climate and so dry a soil moderately thick planting is required. What injures the staple most is the practice of picking whether the day is dry or wet, and at the picking time wet days or at least thunderstorms are not uncommon. The women bring in the cotton packed in large bundles on their heads. These loads are weighed or the weight is guessed at and the bundles are thrown on the rest of the heap in the room, shed, or cattle-house, where the husbandman may be storing his seed cotton. This goes on for days, often for weeks, and when the huge heap is finished, it is often allowed to lie for months without being examined or even looked at. The result is that the huge mass steams and heats through the rainy months, and the fibre is hopelessly weakened and impaired. When the raw cotton is brought out of such a store-room it is never fit to gin, either with the saw-gin or the foot-roller. No machine will work it; they clog and choke and will not turn out the cotton wool until it has been thoroughly dried in the sun, and often until it has been flogged with bamboos, a process which, to some extent, damages the fibre.

Disease.

Though naturally very hardy sudden changes of weather sometimes harm cotton. What tries cotton most are untimely sudden and heavy falls of rain, frequent changes of wind, and cloudy weather. Frost also injures the plant, but frost seldom happens in Belgaum. The people often say their cotton plants are smitten with disease when unusual heat and excessive dryness occur before the tap-roots have passed into the cool subsoil. When this happens the branches and leaves droop, then dry and turn brown, and in the end look as if they had been burnt. The people distinguish six blights or diseases from which cotton is apt to suffer. These are *Banti Rog* (K.), the yellow disease, caused especially in badly drained fields by untimely rain and flooding. The stems and branches become a dirty yellow, the leaves grow red, and the bush droops, and if the flooding or excessive damp lasts long enough the plant dies. *Banji Rog* (K.), the barren disease, is caused by hard east winds blowing night and day accompanied by cloudy weather. This disease seems to stop growth. The plant almost ceases to show fresh leaves, and the flowers and bolls no longer develope. The name *Gugari Rog* (K.), that is the half-cooked grain disease, shows that the soil and air have partially boiled or cooked the cotton plants. It is caused by excessive moisture and dull weather with heavy clouds and slight changing winds. The leaves shrivel and dry. *Shidi Hayu* (K.) of

twenty-eight pounds of American unginned cotton. With local cotton they were paid in kind, generally about one-sixth of what was brought in.

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unknown meaning is caused by long continued harsh north-east winds. The leaves droop but the plant seldom dies. *Majghi Rog* (K.), or the white disease, is brought on by excessive dews at night followed by heavy winds during the day. The leaves turn a dull white and both leaves and flowers droop and die. *Kari Figi Rog* (K.), the black sticky disease, is the worst of all cotton ailments. When it takes hold of a field and the plants are far advanced they hardly ever recover. It is caused by long continued dews and unceasing easterly winds. The leaves become so thickly covered with a dark gumlike substance, that leaves flowers and half-formed bolls die and drop, and, in a short time, a field of strong green healthy bushes turns to charred-looking dirty sticks. Both kinds of cotton are subject to these ailments, but the acclimatised American suffers more than the local cotton. The plants show wonderful life and hardness in recovering from disease when the cause of disease is removed, and healthy weather again gives the bushes a chance. Genial seasonable weather stops all forms of disease. Young plants generally recover, but the full grown suffer and yield short weak and often dull fibre.¹

According to the season the acre yield of clean cotton ranges from forty to fully one hundred pounds. In America the outturn is higher, the average yield over the whole states varying from one hundred and thirty to one hundred and seventy-five pounds. In considering these results the further difference in the proportion of yield of wool to seed in Indian and American cottons has to be remembered. In Indian cotton the usual outturn is three parts seed to one part fibre; in the American cotton it is two parts seed to one part fibre. In other words the American yields fully thirty-three pounds of fibre to every one hundred pounds of seed cotton, and the Indian twenty-five pounds. According to the 1882-83 Bombay Cotton Report, during the five years ending 1882-83 the average estimated acre yield was of American cotton twenty-two pounds and of local cotton thirty-two pounds.²

The cost of growing cotton is difficult to determine. Much depends on the condition of the grower, the number of cattle he owns, the area of land he holds, the number of persons in his house,

Yield.

Cost.

¹ Dr. Forbes, then Cotton Commissioner, has left the following detailed description of a deadly blight from which the cotton suffered in 1867. In December unusually dark and cloudy weather accompanied by untimely and heavy rain, checked the plants and made them droop. Towards the middle of December the first signs of wind blight were seen, and from that time forward the plants passed from bad to worse. The American plants suffered first in their foliage. The leaves grew dark and shrivelled as if blasted and soon after dropped leaving the pods unsheltered. The most advanced pods soon lost their plumpness and opened prematurely, while the younger bolls withered and fell to the ground. The local plant kept its leaves and for a time seemed likely to yield a fair crop. But the bad weather continued, the pods suffered, and their failure was almost as complete as the failure of the American crop.

² The details are: In 1878-79 ten pounds of American and twenty-eight pounds of local cotton; in 1879-80 fifteen pounds of American and thirty-four pounds of local cotton; in 1880-81 sixteen pounds of American and thirty-two pounds of local cotton; in 1881-82 thirty-seven pounds of American and twenty-eight pounds of local cotton; and in 1882-83 thirty-one pounds of American and thirty-seven pounds of local cotton. These figures are probably of little value.

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and many other conditions which more or less affect his actual cash outlay on cotton operations. Roughly the acre cost of growing cotton is 6s. 3d. (Rs. 3½) and the value of the produce is £1 4s. (Rs. 12) leaving a net profit of 17s. 9d. (Rs. 8½) an acre.¹

In the care and skill which they give to the growth of cotton the small landholders are in no way inferior to the large proprietors. Since the introduction of the survey settlement between 1849 and 1857, especially in Athni and Chikodi, the area under cotton has surprisingly increased.

Experiments.
1819.

In 1819, soon after the Karnatak passed to the British when Belgaum was still under Madras, the commercial residents of Bellári recommended that Brazil cotton should be introduced along the Krishna, Malprabha, and Ghatprabha. There is no evidence to show whether these views were approved or acted on. In 1820, Mr. Marshall, then statistical reporter to Government, recommended the growth of Bourbon cotton. Some of it was tried in Belgaum and did well on dry and rather gravelly soils.² In 1828 the Court of Directors authorized the Bombay Government to pay premiums or to give some other encouragement to native cultivators who would prepare approved parcels of cotton of not less than five *khandis* grown from local seed or from foreign seed supplied from Government farms. Soon after this, selected foreign seed, chiefly American, was sent to Bombay with two Whitney saw-gins and several books on the growth of cotton. In the same year Lord Ellenborough, the chairman of the Indian Board, pressed on the East India Company the importance of improving the cotton supply.

1828.

1829.

In 1829, a beginning was made by Dr. Lush as superintendent of botanical experiments for the Bombay Government. The chief aims of these experiments were to procure a better variety of cotton, to introduce a better system of growing cotton, and to improve the ginning or cleaning of the staple. In the Kánarese country Dr. Lush's operations were in great measure confined to Dhárwár. In 1832 the produce was decided to be no better than common field cotton, and the experiments in the Kánarese country were pronounced a failure. In 1832, at Báil-Hongal in Sampgaon experiments were made with Sea Island cotton, Black-seeded Barbadoes, and

1832.

¹ The details are : Government land rent Rs. 1½, seed 1 a. first hoeing 6 as. ploughing 7 as. second hoeing 6 as. drill sowing and hoeing 7 as. grubbing 9 as. picking 10 as., total Rs. 3½. In 1846, Mr. Inverarity, the Collector of Belgaum, estimated that an acre of cotton returned a sum of £1 15s. (Rs. 17½) of which £1 6s. (Rs. 13) had been spent in raising the crop, and 9s. (Rs. 4½) was a balance of profit. The land on which Mr. Inverarity's calculations were based paid the exceedingly high acre rental of 10s. (Rs. 5) and in 1846 cotton was worth only half of what it was worth some years later. In spite of the much higher land rates then in force it paid to sell Belgaum cotton in Bombay at 2d. a pound. In 1850, Mr. Channing calculated the cost of growing cotton, exclusive of assessment, at 3s. (Rs. 1½) an acre. He also estimated the cost of manuring at 4s. (Rs. 2) an acre. As the land is manured the year before the cotton is sown only half of it belongs to the cost of cotton-growing. For the five years ending 1856-57 excluding assessment the mean acre cost of cotton-growing was roughly estimated by local officers at 4s. (Rs. 2) in 1852-53 and 1853-54, and at 3s. (Rs. 1½) in 1854-55, 1855-56, and 1856-57.

² Marshall's Belgaum, 61. Mr. Walton thought the *dev-kapds*, *Gossypium arboreum*, a remnant of the Brazil cotton introduced in 1819. It seems unlikely that so recent a foreigner should gain a place among the holy plants of India.

Gujarát. Some of the seed did not sprout and all failed. The American saw-gins were condemned as unsuitable, which they certainly are for ginning local cotton. To tempt landholders to improve their cotton Government stated that they were willing to take their rents in cotton instead of in cash and that for specially well cleaned cotton they were ready to pay twenty per cent over the market price. No advantage was taken of these offers. Only a very small quantity of clean well-picked cotton was secured. A special agent was appointed to try and improve the preparation of cotton in Belgaum, Dhárwár, and Bijápúr, but his endeavours met with little success. In or shortly after 1832, under Dr. Lush, a Government experimental farm was started at Sigihalli in Khánápúr. The site of the farm was badly chosen as Khánápúr is the part of the district least suited for cotton. The objects aimed at in establishing the Sigihalli farm were to introduce new and better kinds of cotton, and to improve the growing, cleaning, and packing of the local variety. In 1834 a committee of Pársi cotton merchants in Bombay reported so highly on some of the Sigihalli cotton, that Government sent it to England. In England it was pronounced clean and showy, but much injured in cleaning, containing very objectionable small white knots. Of nine lots sent from Bombay the valuation varied from five pence to nine pence the pound. The experts, who made the valuations, added that the value of the injured cotton could not be given with confidence as spinners might refuse to take it, though it might be bought in moderate quantities at the prices named by candlewick-makers, jewellers, and others. These opinions were repeated on another sample of the same white-seeded perennial kind subsequently sent to England from the Sigihalli farm. Relieved by occasional successes the result of the Sigihalli farm continued disappointing till it was closed in 1836 by Sir Robert Grant, then Governor of Bombay (1835-1838), who held that enough had been done to show that the attempt to improve the Karnatak cotton was a failure.

In 1835, Lord Ellenborough, President of the Board of Commissioners for the Affairs of India, suggested that Egyptian seed should be tried in Western India. He also suggested that, to ascertain the best means of cleaning cotton, specimens of the machinery used in America, Brazil, India, and Egypt, should be sent to London. To carry out these views Dr. Lush sent a foot-roller and a common ginner or *charka*. At the same time Dr. Lush noticed that he had not found the foot-roller able to clean any foreign cotton; he probably meant any New Orleans. In 1836, when the experiments to improve the cotton were stopped, Government offered for five years to forego the assessment on all Government land under cotton. This concession did not meet with the approval of the Court of Directors, and the remission was cancelled in January 1838. In 1839 further enquiries into the causes of the unsatisfactory state of Western India cotton led Sir J. Rivett-Carnac, then Governor of Bombay (1839-1841), to the conclusion that dirty cotton gave the local dealers and middle men a better return than clean cotton. About this time the Court of Directors determined to try how far Indian cotton could be

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improved by employing American planters in India. Captain Bayles, of the Madras Army, was sent to America. He not unnaturally met with great opposition. The cry was raised that it was an English scheme to ruin the American cotton trade; the American papers urged that it was a public duty to prevent Captain Bayles securing planters; he had to go about armed and was forced to work in secret. At last twelve planters accepted his terms and agreed to come to India to conduct experiments in growing cotton. Three of the twelve arrived in Bombay in 1840. In 1841 Mr. Mercer one of the American planters, with two assistants Mr. Hawley and Mr. Channing, was sent to Dhárwar, where they began an experimental cotton farm at Kushgal, five miles north east of Hubli.

The American planters came to the country with the object of introducing the American system of growing cotton. They naturally at first paid little attention to the local modes of tillage, and viewed their roughness and imperfection with contempt. Experience taught them that American tools and American rules were unsuited to the country, and that the local tools and the local rules were suited to the country. Only after adopting local methods did their operations prove at all successful. In 1841 the American planters noticed adulteration as one of the chief causes of the depression of the Indian cotton trade. They said that both European and native merchants found that dirty and falsely packed cotton yielded a better return than clean.¹

1845.

In 1844-45, 185,388 and in 1845-46 117,188 acres were under cotton. In 1845 experiments were begun in Belgaum with the view of introducing foreign cotton and saw-gins. Mr. J. W. Channing, who since 1841 had been Mr. Mercer's assistant in Dhárwar, was transferred to Belgaum. In March 1845, Mr. Frere the Collector of Belgaum, reported that Mr. Channing had decided to begin work at Neganhá in Sampgaon and wished to have three hundred acres of land. Government considered Mr. Channing's estimate too high and thought the experiment would succeed better farther east. Mr. Channing kept to his opinion that Neganhá was the most suitable place for experiments, and a farm was accordingly started at Neganhá. Mr. Channing proposed to sow his fields with New Orleans, Broach, and Sea Island cotton. Broach seed was ordered, and New Orleans, probably supplied by Mr. Shaw the Collector of Dhárwar, was largely planted. In October the prospects of the American cotton were so promising that the superintendent applied for two gins of twenty-five saws each. The stock of machinery was so small that Government could spare only one machine of fourteen saws. Early in 1846 some American gins arrived in Bombay for sale, and two of these, one of twenty-two, the other of twenty-five saws, were secured for the Belgaum cotton farm. Mr. Channing proposed to keep one for his own work and sell the other, and this was sanctioned. Early in February 1846 bad weather set in, and the superintendent complained that, though the plants looked healthy

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¹ Adulteration was no new feature in the Bombay cotton trade. As early as 1810, before the Karnatak came under the British, the Court of Directors called the attention of the Government of Bombay to the disgraceful state in which cotton arrived from India.

and showed quantities of flowers, the crop would not mature, but fell off just as the bolls were forming. When Government heard of this failure they asked whether it was due to the unfavourable season and not rather to the unsuitable situation of the farm. In reply Mr. Channing reported a great improvement in the crop, and begged that for the present judgment regarding the farm might be suspended. He also brought to notice a demand among dealers for the use of gins, and asked that spare machinery lying at Broach might be sent to him. This was sanctioned, and he recommended that for two shillings (Re. 1) 756 pounds (27 *mans* at 28 lbs. the *man*) of well picked and 672 pounds (24 *mans*) of average seed-cotton should be ginned. Though the result was not completely satisfactory the market price of the New Orleans was twelve per cent above that of the local staple. The results with Broach seed were encouraging and the crop turned out a success.

In 1845-46 the American planters came to the conclusion that the local cotton was nearly as good as any cotton grown in India. It was the dirt-trash mixed with it, in most cases wilfully, that ruined its name in European markets. The Bombay cotton trade showed so serious a decline that in 1844 and again in 1846 a committee was appointed in Bombay to enquire into the reasons and to suggest a remedy.¹ In 1846-47, from the experience of the previous season, Mr. Channing recommended that at Neganhál he should cultivate only as much land as could be managed by his two pairs of bullocks and that he should be authorized to make contracts at four Parasgad and at two Sampgaon villages to have twenty acres in each village cultivated on Government account. These proposals made necessary another ginning establishment at Murgod, about fifteen miles north-west of Saundatti. The superintendent considered these new measures so successful that, towards the end of the year, he asked leave to give up the Neganhál farm, and carry out all his operations on the contract plan. In supporting this proposal the Collector stated that 1300 acres were under Orleans seed and 726½ under Broach. He believed that these two varieties would be grown to any extent that Government might wish if the produce could find a market. Government sanctioned the superintendent's proposals and granted him two gin-learners. On the whole, as in the previous year, the Broach was a success, but New Orleans after a good promise failed to ripen. Further experience showed that Broach cotton was unpopular with the people because of the difficulty in clearing the stumps of the old plants. In addition to the experiments with New Orleans and Broach the superintendent planted 248 pounds of Narma or Central Indian cotton, eighty-eight pounds of Georgia, fifty-six pounds of Sea Island, and thirty-six pounds of Bourbon. None of these sowings succeeded. The purchases and sales of cotton in 1846-47 showed a considerable balance in favour of Government. New Orleans, which cost Government £7 15s. (Rs. 77½) to lay down in Bombay, was sold in Bombay for £12 (Rs. 120); Belgaum-grown Broach cost £6 15s. (Rs. 67½) to lay down in Bombay and fetched

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¹ Details are given in the Trade Chapter.

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£12 10s. (Rs. 125); local Belgaum cost Government £7 1s. (Rs. 70½) to lay down in Bombay; what it fetched is not stated. In this year Belgaum New Orleans sold at 14s. (Rs. 7) a *khandi* above Dhárwár New Orleans. In 1846 Mr Mausfield, the Collector, in describing the results of the American experiments recorded the opinion that the Indian system of tillage was better suited for India than the American system. In his opinion the American system was more costly than India either could afford or required.

In 1847-48, 2617 acres were under New Orleans and 115,888 under local cotton. The result of the sowings of New Orleans was far from encouraging, the rainfall was scanty, and much of the crop was lost by heavy wind and rain in the picking season. Mr. Channing feared that so few fields had yielded a good crop that in the next year many of the people would keep from sowing New Orleans cotton. The superintendent was unable to buy in Belgaum all the New Orleans cotton required by Government. He bought the balance in Ron, Hungund, and Bágalkot, where the growth of New Orleans had spread. At this time the tillage in some parts seems to have been very slovenly, the average acre return of clean cotton varying from thirty to fifty-five pounds or about one-third to one-half of the yield of well-tilled ground. In 1847, about nine thousand pounds of New Orleans, Broach, and local cotton, the produce of the Neganhál farm, together with four hundred bales of bought local staple cleaned by the saw-gins at Báil-Hongal and Saundatti, were sent to Vengurla. On the way to Bombay the native vessel met such severe weather that eight of the packages had to be thrown overboard and most of the rest was so damaged that it had to be sold at Bombay by public auction.

In the same year (1847) the Belgaum and Dhárwár experiments were united under one superintendent, and it was proposed that Mr. Channing should have the double charge and should be transferred from Belgaum to Kushagal in Dhárwár, with a mechanical assistant under him. Under instructions from the Board of Directors Government ordered Belgaum to provide a yearly supply of seven hundred and fifty bales of local and seven hundred and fifty of New Orleans. The number was afterwards reduced to five hundred bales of each kind and from the want of saw-gins the actual purchases came only to about two hundred bales. The Bombay Government applied to the Court of Directors for five thousand more saws for fitting new gins. In some places the cultivation of New Orleans had taken such a hold of the country, and the farmers understood its cultivation so well, that Mr. Channing estimated that some landholders near Báil-Hongal had raised crops yielding an acre outturn of about one hundred and twenty pounds of clean cotton. The actual area under New Orleans seed in five sub-divisions, two of which are now in Bijápur, was slightly under four thousand two hundred acres.

News of the unusually heavy crops that were gathered near Báil Hongal brought some Bádámi and Hungund landholders to buy the American seed. The President of the Manchester Commercial Association declared that some of the cotton received from Mr.

Channing was superior to American uplands. New Orleans now fetched fifteen per cent more than the local Belgaum. Through the agency of the Government planters, Mr. Turner, a Manchester merchant, bought (1847) a quantity of the Southern Mārātha acclimatized New Orleans. The cost of delivering the cotton in Manchester was $3\frac{1}{2}d.$ ($2\frac{1}{2} as.$) the pound, and Mr. Turner realized $6d.$ to $6\frac{1}{2}d.$ ($4-4\frac{1}{2} as.$) a pound. He also had fifty pounds of it tested with ordinary Orleans from America. The result was in favour of the Indian Orleans which when unadulterated beat the American by about two and a half per cent. The result of Mr. Turner's purchases shows what could be done, even in those days, when the staple was carefully grown and honestly ginned and packed. The high value of the Indian New Orleans was again recognized in September 1847. Some five hundred bales of Belgaum and Dhārwar New Orleans sent to England by Government were shown for sale in the Manchester Exchange. The cotton caused a considerable sensation. Before the day was over nearly four hundred of the bales were sold at $6\frac{1}{2}d.$ ($4\frac{1}{2} as.$) a pound, when the highest price of other Surats was only $5d.$ ($3\frac{1}{2} as.$) The spinners thought the Belgaum unadulterated American equal to middling Bowed and well suited for all counts of yarns under forties.¹ The Manchester newspapers strongly urged the local manufacturers to buy their cotton direct in the Indian districts. So long as Bombay afforded a ready market for dirty dishonest cotton Government efforts to stop the evil were futile. The papers thought that a large and certain supply of honest Indian cotton could be secured only by the co-operation of the Lancashire manufacturer. This appeal seems to have had little practical effect. For many years Government were left, almost unaided, to the work of attempting to suppress fraud and secure pure cotton.

At the same time (1847) the high value of the Belgaum cotton in the English market was being seriously threatened by the prevalence of adulteration and fraud. This adulteration of cotton was in a great measure due to the small number of saw-gins. Only three gins were in use on Government account and of the three one at Saundatti was sold during the season for £22 (Rs. 220). Sixteen more were being made for Government and four for private persons. During the season adulteration was so rife that many officers recommended that a law should be passed making adulteration penal. Government thought that the provision of Regulation III. of 1829 if enforced would do much to suppress the evil. Notices were printed and circulated warning growers and dealers in cotton that Government were determined to put down gross adulteration and false packing. These threats and warnings had little effect. Before a committee of the House of Commons, Mr. Turner, who, as noticed above, had large dealings in Belgaum cotton, stated that his firm were on an average out of pocket £7000 (Rs. 70,000) every year from the clay, sand, twigs, and seed which were mixed with the cotton. So bad a name did this adulteration give Indian cotton that

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¹ This cotton was called Bowed because before the saw-gin was invented it was cleared by the Indian cotton-bow.

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as a rule spinners used it only when they could find nothing else to use.

In 1848-49, partly in Belgaum partly in Bijápur, the area under New Orleans rose to 6750 acres. The yield was good, but the people found it difficult to get buyers. The want of a market for New Orleans was more felt than for the local cotton, as large quantities of the local cotton were spun and woven in the district. In this year two proprietors or *jágirdárs* and two cotton dealers in private villages applied to the Collector for saw-gins. An English cotton broker's report on the staple sent to England in 1847-48 described the Belgaum New Orleans as clean and bright, of good colour and staple, in every respect superior; the Belgaum local cotton was good ordinary Surat with leaf and dirt, of short staple, and similar to average Surat. The 1848-49 shipments of New Orleans are described as of rather high colour, good staple, and very clean; and of the local cotton as of high colour, but of good staple and clean. Both kinds sold at 7½*d.* the pound. Early in 1848, the Honourable Mr. Reid, then Member of Council, stated that Belgaum and Dhárwár cotton was quoted at £11 4*s.* (Rs. 112) a *khandi* while no other Indian cotton fetched more than £8 10*s.* (Rs. 85). He urged that more saw-gins should be sent from England and that a fresh supply of Orleans seed should be brought from America. At this time in Liverpool, ordinary Orleans cotton was worth 6½*d.* a pound, Belgaum Orleans 6¼*d.*, and the best Surat 5¼*d.* At the same time Belgaum Broach seed sold in Bombay at five per cent above Belgaum Orleans. Next year, in consequence of Mr. Reid's representations, twelve hundred new saws were brought from England and sent to Belgaum.

In the same year (1848) the Board of Directors, in London, reviewed the recent attempts to introduce New Orleans into the Kánarese districts. They thought that the time had come when the growth of New Orleans might be left to make its own way. They wished Government to limit their action to supplying new seed and introducing improved ways of preparing the staple. They also stated that they were sending from Liverpool one hundred bushels of New Orleans and fifty of Georgian seed from the best selections of the forthcoming American crop. The Georgian was recommended for poor soil. In 1848, according to Mr. Channing, the practice in the Belgaum cotton trade was for the dealers to make advances to the landholders on the security of the growing crop. The ordinary interest for an advance on the security of a growing crop was thirty-eight per cent. Not content with this heavy interest, when the dealers received the cotton they exacted a further levy of about fourteen per cent (3-4 lbs. the *man*). The landholders resented these exactions and to be revenged on the dealers wilfully mixed dirt with the cotton. Mr. Inverarity, the Collector, confirmed Mr. Channing's explanation of the origin of much of the dirt in cotton. He doubted if adulteration could be put down except by opening roads and letting in capital to compete with the local dealers. In the same year (1848) the Bombay Chamber of Commerce drew the attention of Government to the grave injury to the cotton

trade caused by adulteration. They suggested that inspectors should be-appointed to examine and stamp the staple before shipment, and that every package should have marks which would make it easy to trace the person who had ginned it and grown it. In America provisions of this kind had nearly put an end to fraud. Adulterated cotton should, they thought, be taken before a magistrate, and half of the penalty given to the informer. If Government approved, the Chamber were ready to submit a draft Cotton Frauds Bill. Of all the cotton that came to Bombay perhaps the worst and the most fraudulently packed came from the Kánarese districts. The Chamber's proposals were referred to some leading firms who did not belong to the Chamber, and, with one exception, the Chamber's statements were confirmed and their proposals approved.¹ Government officers were less agreed than the merchants as to the wisdom of the Chamber's proposals. Mr. Townshend, the Commissioner, thought that the Chamber's proposal could not be carried out in Belgaum and matters were allowed to remain unchanged.

In 1849-50, 3059 acres were under Orleans and 145,216 under local cotton. The crop was good in the east and poor in the north. The average acre yield of clean cotton was estimated at about thirty-seven pounds for Orleans and thirty-nine pounds for local cotton. There was a good demand for the cotton. Government bought about a quarter of the experimental crop. The indebtedness of the landholders made them indifferent. Mr. Townshend, the Commissioner, noticed that the superintendent gave 1s. 4½d. (11 as.) for twenty-eight pounds of well-picked Orleans and only 1s. 1½d. (9 as.) for twenty-eight pounds of well-picked local cotton. These terms Mr. Townshend thought unduly favourable to the New Orleans. He thought the American cotton might now be left to take its natural place in the market. The superintendent explained that the native dealers were hostile to the New Orleans and that unless Government bought it, it would find no sale. Mr. Inverarity, the Collector, supported the superintendent, noticing that the dealers failed to see that the crop which paid the grower best must in the end pay the dealer best.

In 1850, Mr. Mackay, the special commissioner sent by the Manchester Chamber of Commerce to enquire into the condition of the cotton trade in India, was struck with the injury caused to the cotton trade by adulteration. He found bales whose ropes were so thickly coated with mud that instead of four and a half pounds they weighed fourteen and a half pounds. In the same year (1849) the Bombay Chamber of Commerce wrote to Government complaining of the state in which Belgaum American reached Bombay. It was not cleaned in any way and was so full of seeds and dirt as to be nearly unsaleable.

In 1850-51, 2332 acres were under New Orleans and 181,728 under local cotton. The season was marred by exceptionally trying

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¹ The exception was Messrs. Forbes and Co. who expressed the opinion that the only way to improve the cotton trade was to abolish the land-tax. This proposal Lord Falkland, then Governor of Bombay (1848-1853), described as not worthy of notice.

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and severe east winds. In five sub-divisions the experiments failed and in four there was only half a crop. The average acre yield of New Orleans was thirty pounds of clean cotton. Government, who were anxious to encourage private enterprise, refrained from buying. Mr. Davis, the first recorded English agent, was sent by Messrs. Lancaster and Company of Bombay to buy and gin cotton. Mr. Davis was provided with gins by Government but most were faulty and were returned. In his report for this year Mr. Channing noticed that much might be done to prevent seed from declining by shifting it from one part of the district to another. His experience also showed him that large plants did not yield the best staple. Plants of about two feet high gave the best and largest crops. Mr. Walton's experience during the fifteen years ending 1880 confirmed the correctness of Mr. Channing's views on both of these points.

At this time the Manchester Commercial Association repeatedly pressed on the Court of Directors the advisability of inducing the people of Belgaum and Dhárwár to grow their cotton earlier in the year. Mr. Channing strongly supported this recommendation and did his best to help the change. He did not succeed. It has already been noticed that further experience has shown that in the choice of the seed-time the people were right and Mr. Channing and the Manchester Association were wrong.

In 1850, Government approved a suggestion of Mr. Shaw, Collector of Dhárwár, that when cotton was not wilfully ill-treated the penalties of Regulation III. of 1829 should be sparingly inflicted. No information has been traced to show how far this proposal was carried out in Belgaum. In the same year the Bombay Chamber urged Government to take steps to improve the state of the local Belgaum cotton. In the Chamber's opinion it was the worst adulterated and the most fraudulently packed cotton that came to Bombay.

In 1850, Government distributed foreign cotton seed sent by the Court of Directors. It was called sugar-loaf cotton seed and was probably the variety best known as Bourbon kidney seed cotton. Three barrels, containing about three hundred pounds of seed, were sent to Belgaum, and it was planted in about thirty-two acres at Saundatti. About two-thirds of the seed failed to sprout. The plants that did come were at first small and sickly. In November they looked healthy and promised fairly, though inferior to New Orleans cotton. The Collector advised that no more of this kind of seed should be sent. In this year Government insisted on the importance of keeping the Orleans seed unmixed. New Orleans seed was also distributed in Chikodi and Sampgaon.

In 1850, Mr. Townshend, then Revenue Commissioner, expressed the opinion that experimental farms were costly and were of little use. That certain cotton could be grown in an experimental farm at a profit was no proof that it would pay the ordinary landholder to grow it. The Governor, Lord Falkland (1848-1853), approved of Mr. Townshend's views and expressed the opinion that more good might be done by improving the cleaning, growing, picking, and carrying of the local cotton than by introducing foreign varieties.

In 1851-52, 2212 acres were under New Orleans and 158,372 acres under local cotton. During this year Mr. Channing died. He was succeeded by Mr. Blount who had been in charge of cotton experiments in Dhárwár. The season was unfavourable. Mr. Blount estimated that the average acre yield of clean Orleans was not more than six pounds.

In 1851, Mr. Reeves, then Collector, reported that he had sent to Bombay 46,256 pounds of Orleans and 76,040 of local cotton of this and of the previous year's crop. This was only half of what he had been asked to send, but the rest of the crop had been bought by outside merchants. Two more cotton-gins were ordered and Mr. Reeves was asked to send Belgaum New Orleans for trial to Sindh.

Meanwhile Mr. Mackay, the special commissioner of the Manchester Chamber of Commerce, had drawn up a lengthy report in which among other things he made some remarks on the system of tillage in Belgaum. Mr. Mackay's report was sent to the Collector of Belgaum for opinion. With reference to Mr. Mackay's remarks, Mr. Havelock, then (1851) for some time in charge of Belgaum, wrote that he thought that if Mr. Mackay knew more of the country he would change his views about the defects of the Belgaum system of tillage. In his own case increased knowledge of the local system had led to increased respect for it. He knew that some of the American planters frankly admitted that there was much in the native system of farming to admire and that it was well suited to the circumstances of India. Mr. Walton's experience (1865-1880) confirmed this opinion. No experiments had succeeded except those which were based on local methods.

In 1851 adulteration was as bad as ever. The Bombay Chamber again complained that the Southern Marátha cotton had all the worst characteristics of Indian cotton in the days of its greatest shame. Nothing but the strong hand of authority could stop the wholesale mixing of seed. Government asked merchants to help by giving information whenever they received falsely packed and adulterated cotton. This the merchants said they could not do; only Government could stop the export of unmarketable cotton. Government called on the Collector to enforce the provision of Regulation III. of 1829 as strictly as possible. In the same year (1851) Mr. Channing, shortly before his death, urged on the Collector of Belgaum the necessity of securing pure seed. Strict attention to purity of seed was the more necessary because Government were retiring from the cotton trade and were trying to introduce Bombay agencies into Belgaum. As regards the mixing of cotton, Mr. Reeves, the Collector, after examining much of the growing crops, was satisfied that the mixing was not as a rule done in the fields, but at the gins. Mr. Reeves also reminded Government that much of the cotton which reached Bombay so shamelessly adulterated was not grown or ginned in Belgaum though it had passed through the district.

In 1852-53, 1950 acres were under New Orleans and 168,427 acres under local cotton. The New Orleans was almost a complete failure. In 1852 adulteration was as bad as ever. The coast

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dealers petitioned Government to pass an enactment to punish cotton frauds. They were helpless. If they refused to take adulterated cotton their rivals took it or the up-country dealers sent it straight to Bombay. In 1853-54, 1386 acres were under New Orleans and 192,284 were under local cotton. The east of the district suffered from drought and over large tracts the cotton crop was an almost total failure. Mr. Inverarity the Collector, and Mr. Courtenay the Revenue Commissioner, agreed in recommending that the experiments should cease. Government approved of their opinion and said that if it was found to pay New Orleans would of its own accord spread north from Dhárwár to Belgaum. In 1853 the experiments were given up. At the same time orders were issued that every encouragement should be given to any undertaking that tended to a free and natural extension of the cultivation of New Orleans. Orders were also issued to give every facility for the repair of saw-gins and the distribution of seed.

In 1853, a decision of the Belgaum Judge, which was confirmed on appeal, made the provision of Regulation III. of 1829 almost a dead letter by allowing the owner of adulterated cotton to plead the credulity, negligence, and error of his servants. In 1854-55, 1911 acres were under New Orleans and 167,317 acres under local cotton. In 1855-56, 1728 acres were under New Orleans and 124,185 were under local cotton.

In the discussions about the evils of mixing and false packing it had often been said that the saving of the cotton trade would be for a European merchant to go or to send a European agent to the cotton country to buy as nearly as possible from the grower. In 1855, one English merchant went to Belgaum. He found he had to travel hundreds of miles with his rupees on his back, and that he had no resting-place but the ground. He had to weigh the cotton himself in little lots and when he bought it he had no place to warehouse it and no means of carrying it to the coast. In 1856-57, 4461 acres were under New Orleans and 183,091 acres under local cotton. In 1856, the Court of Directors noticed that in 1854-55 in Belgaum only 1911 acres were under New Orleans. They considered that the experiments had led to no results of any consequence and that a continuance of them was unlikely to bring any permanent good effect. Except the distribution of improved seed the Court thought that experiments might be left to private enterprise.

For the three years ending 1846-47 the cost of Government cotton experiments in Belgaum, including the superintendent's pay during some of the time, appears to have been about £827 (Rs. 8270); while the receipts in India were only about £26 (Rs. 260). Of the value of the cotton which was sent to England, which in every case formed the bulk of the crop, no details are available. In 1847 the charges are entered at about £385 (Rs. 3850) and the receipts at £21 (Rs. 210) apart from the proceeds of more than 100 *khandis* which were sent to England. In 1848, the operations cost £1581 (Rs. 15,810) and the receipts amounted to £221 (Rs. 2210) in addition to over one hundred *khandis* of cotton shipped to England. In 1849, the cost amounted to £1949 (Rs. 19,490) and the

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recoveries to 8s. (Rs. 4) besides about ninety-five *khandis* sent to Great Britain. In 1850, the expenses were £2522 (Rs. 25,220) and the receipts about a hundred and fifty-six *khandis* exported. In 1851, the expenditure was £2306 (Rs. 23,060) and the receipts about £213 (Rs. 2130) and about fifty-eight *khandis* shipped to England. In this year an adjustment of cotton transactions was made between the Dhárwár and Belgaum collectorates, by which Belgaum was credited with refunds of about £1162 (Rs. 11,620). A farther shipment of about twenty-five *khandis* was also made on account of the Belgaum experiments. In 1853-54 the staff was reduced to one clerk and the charges fell to £18 (Rs. 180) and the receipts to £115s. (Rs. 173). In this season there is no record of any shipment of cotton. In 1854-55, as experiments had been altogether discontinued, the only expenditure was £1 10s. (Rs. 15) paid for lithographing a number of vernacular notices telling husbandmen how to obtain the best seed and cotton-ginning machinery. Experiments were thus carried on for about ten years (1845-1855), and during the greater part of that time were under the control of an experienced planter. The total cost appears to have been £9590 (Rs. 95,900), which, with receipts in India returned at £1646 (Rs. 16,460), leaves a net cost of £7946 (Rs. 79,460). The records show that during these ten years some five hundred and thirty-four *khandis* of cotton were shipped to England to be sold on Government account and more than this was probably sent. Even if only 534 *khandis* were sent the cost would be only £15 (Rs. 150) a *khandi*. In Mr. Walton's opinion the long series of experiments showed that New Orleans cotton was well suited to Belgaum. It suffered from the uncertainty of the climate, but accidents of climate also injured, sometimes destroyed, the outturn of the local crop. The chief difference was that the New Orleans seed tended to deteriorate. Mr. Walton believed that if Government had adopted Mr. Reeves' advice to have the saw-gins repaired by the superintendent at the owner's cost as was done in Dhárwár, Belgaum like Dhárwár might still have a large trade in New Orleans. The New Orleans crop was much more valuable than the local crop. It took less time to ripen, it was in more general demand in Europe, it yielded a greater outturn of uncleaned cotton, and the proportion of wool to seed was much greater in New Orleans than in the local cotton. Mr. Walton estimated that with the same tillage area, if, over Belgaum and Bijápur, New Orleans had taken the place of local cotton, the addition to the crop, partly from greater outturn partly from the higher proportion of wool, would represent 40,000 bales at the average prices of 1878, worth £400,000 (Rs. 40,00,000).

In 1857-58, 1487 acres were under New Orleans and 230,548 acres were under local cotton. In 1857, the Chamber of Commerce represented to the Government of Bombay that from the systematic mixture of the seed cotton in the gins the name of American Belgaum and Dhárwár cotton had greatly suffered in Bombay. They also complained that the American and the local were mixed in the same field. Government ordered their officers to take such steps as they thought advisable to check the evils of which the Chamber complained. In this year experiments were made with Egyptian staple in three sub-divisions of Belgaum and in two of Bijápur. The results were

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unsatisfactory and Mr. Seton-Karr, the Collector, feared that the seed had been damaged in transit. It was sown much more thickly than usual, but not half the seeds sprouted. Mr. Seton-Karr thought it might succeed if watered, but the people were unwilling to undertake further experiments. Nearly fifty acres were planted in thirty-four Bijápúr villages. Only in a portion of these did the seed come up, and even there the return was miserable. In five Athni villages there was no outturn. Forty acres were planted in three Parasgad villages, but the average acre yield was only seven pounds of cleaned cotton. Samples sent to the Bombay Chamber of Commerce were found damaged by insects. The uninjured cotton was superior, and if well ginned would fetch a price equal to Egypt-grown Egyptian. In 1858-59, 1558 acres were under American and 244,787 under local cotton. Almost the whole area under New Orleans between 1854 and 1858 was in Bádámi in Bijápúr and not in the present Belgaum. In 1858 the Bombay Chamber said that it was useless for European firms to send agents to the cotton districts in the absence of security against frauds and impositions in preparing and packing cotton. In 1859-60, 1977 acres were under New Orleans and 288,668 under local cotton. In the same year Egyptian seed was distributed gratis in twenty-two Bijápúr and eighteen Belgaum villages which had some of the best cotton land in the district. Instructions were given regarding the sowing. Of the Bijápúr villages in Bádámi the seed came up in two villages and failed in other two; in Hungund it sprouted in six villages and failed in nine; and in Bágalkot it came up in one and failed in two. Of the Belgaum villages the seed sprouted in twenty-four fields and failed in two; in Tásgaon, now in Sátára, it came in five and failed in two; and in Gokák it failed in nine and came in one. Mr. Seton-Karr believed that the seed was good and sound. The results were miserable and the people were averse from any further attempt to grow Egyptian cotton. Mr. Seton-Karr sent Dr. Gibson four pounds of the seed and asked him to try it in the Government gardens at Dápuri and Hewra in Poona. The seed was sown at the end of April, and when they seemed to want it the plants were helped with water. Mr. Walton doubted if the Belgaum people had given the Egyptian seed a fair trial. In 1859 the Bombay Chamber of Commerce explained the fall in the quality of the Belgaum Orleans by supposing that it had been crossed with the local variety. This seems to have been a mistake. Dr. Forbes, the Cotton Commissioner, made enquiries which satisfied him that the decline in the quality of Orleans was not due to crossing with the local cotton.¹

In 1859, the Bombay Chamber again appealed to Government for help against adulteration. The merchants had no means of inducing

¹ In 1845 Mr. A. Elphinston, the Collector of Ratnágiri, paid much attention to the crossing of cotton. He succeeded in getting some seeds which he called mixed Bourbon. These seeds were distributed by Government, but the result was unsatisfactory. In 1872 experiments were made in Sind and it was hoped that they had succeeded in producing a cross, but this proved a mistake. Mr. Walton's experience led him to agree with Dr. Wight of Madras that, though by a freak of nature a cross might take place, there was no reason to hope that local Indian and American cotton could ever be hybridised.

the landholder to improve his cotton. They could not refuse to accept mixed or adulterated cotton because the mixing was universal. In 1860-61, the Civil War in America increased the area under New Orleans to 6514 acres and under local cotton to 243,823 acres, and in 1861-62 New Orleans rose to 6620 and local cotton to 278,963 acres. In 1860 it was stated, in Mr. Walton's opinion, correctly, that the chief cause of the badness of the Belgaum cotton was the greed and the fraud of the local cotton-dealer or middleman as he was called. The local dealer was said to be able to secure for himself the benefit of all the improvements effected by Government. It was a common practise in the ginning yards to find a large heap of trashy local cotton and near it a pile of American of about the same bulk. The space in front of the ginning room was covered with a mixture of the two heaps spread in the sun to dry. It was this mixture which was being cleaned in the gins. No cotton details are available for 1862-63 and 1863-64.

The unusual demand and rapid rise of price caused during these years by the war in America led to a great increase in adulteration, mixing, and false packing. The Commissioner, Mr. Hart, found the local officers unable to prevent these frauds. They urged him to move Government to take measures to check these abuses which they were satisfied must end in making Belgaum cotton unsaleable. It was found that the presence of European agents in the cotton-growing districts caused no diminution in the frauds. The agents represented merchants, not manufacturers; they bought to sell again, and in the turn-over dirty cotton might yield more profit than clean. The penal provisions of Regulation III. of 1829 were practically a dead-letter chiefly owing to the fact that the possession of mixed or dirty cotton was not an offence unless, which was often impossible to prove, the cotton was shown to be offered for sale. About the same time the Bombay Chamber once more drew the attention of Government to the ruin which adulteration was working in the cotton trade. Matters were worst in the Bombay Karnatak where cotton adulterating was a recognised calling. These representations and special inquiries satisfied Government that fraud was so widespread that, unless it was checked, the value of Bombay cotton must seriously suffer. They appointed a Commission who took evidence in Bombay and visited and made enquiries in the cotton-growing districts.¹ In the Kanarese districts the Commission found many of the traders and growers so anxious that adulteration should cease that they were willing to pay fees to support the necessary establishment. An examination of the evidence collected by the Commission led Government to ask them to prepare a draft Act for the suppression of cotton frauds. After much discussion and with various changes the draft became Act IX. of 1863. The value of the Act was greatly lessened by the absence of a definition of what constituted adulteration. This point was to a great extent left to the discretion

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¹ The Commissioners were: Mr. G. Inverarity, Commissioner of Customs, president; Messrs. Forbes and Forjett, appointed by Government; and Messrs. Scott, Hannay, and McIlwraith, chosen by the Chamber.

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of the magistrate, and, as many magistrates were disinclined to convict, prosecutions often broke down. Still, in Mr. Walton's opinion, the fear of punishment to some extent reduced the amount of adulteration.

In 1864-65 Bijápúr was formed into a separate collectorate. In that year within the limits of the present Belgaum were 3731 acres under American and 145,928 acres under local cotton. The American staple was so largely mixed with the local that no pure American was available. In 1865-66, 3730 acres were under American and 163,676 under local cotton. The season was unfavourable and there was a marked deficiency both in the quantity and quality of the crop. In 1865, Mr. Walton attempted to revive the growth of American cotton in some of the best central sub-divisions of Belgaum. The seed was sent to Sampgaon and grew well, but the attempt failed for want of gins. Under the Cotton Frauds Act Kánarese cotton was carefully examined at the Ratnágiri port of Vengurla. This had a marked effect in checking adulteration. In 1866-67, 1865 acres were under American and 130,810 acres under local cotton. Under the influence of the cotton inspectors New Orleans was grown much more purely than formerly. In 1866 Mr. Bulkley, the Inspector-in-Chief of Cotton, brought to the notice of Government that the existing provisions of the Cotton Frauds Act failed to check the mixing of different kinds of cotton and the adding of seed or uncleaned cotton at the ginning establishments which were scattered all over the district. Unless the inspector caught a gin-master in the act of mixing the prosecution failed. The people knew when the inspector was at hand and the mixing stopped till he was gone. In the yards were the heaps of different kinds of cotton ready for mixing and the seed-cotton ready to be thrown in to make weight. The inspector knew with what object the different cottons and the seed were there, but he could not interfere. The cotton must be offered either for pressing or sale, and as there were no local presses and the cotton was not sold till it reached Bombay the mixers and dirt-adders were safe. In 1867-68, 2825 acres were under American and 122,191 under local cotton. The increase in the area of New Orleans was chiefly due to the improved arrangements for keeping the saw-gins in repair. The opening of a new ginning factory at Navalgund in Dhárwár proved a great convenience to the people of Parasgad. Early in the year the bushes were attacked by a blight which, it was calculated, destroyed thirty-five per cent of the crop. The local cotton suffered more than the American.

In 1868-69, 3098 acres were under American and 120,677 under local cotton. The cultivation of American was well maintained. Blight reappeared and did great damage, in some places destroying nearly the whole crop. In Parasgad the adulteration of American by foot-rolling local staple into it was detected. In 1869-70, 7588 acres were under American and 205,672 under local cotton. These are the largest areas on record. In 1869 a draft Bill to amend the 1863 Cotton Frauds Act was introduced into the Bombay Legislative Council by the Honourable A. H. Campbell. After much discussion

and several changes the Bill was passed. But it was not sanctioned by the Government of India and the Act of 1863 was continued for nine years more. In 1870-71, 13,166 acres were under American and 163,072 were under local cotton. This rise in the area of American cotton was owing to an improved arrangement for repairing gins. The new arrangements were not continued and the spread of American ceased. The arrangement with the Navalgunn ginning factory for repairing gins in Belgaum villages came to an end and the area under American fell to 7295 acres. In 1871-72, 7295 acres were under American and 154,181 under local cotton. The fall in the cotton area was partly due to the discouragement caused by the blight in the previous year, partly to a decline in the quality of the American seed. Many attempts to adulterate cotton were detected. This was a bad year for cotton. The growers tried to make up for the shortness of the crop by increased adulteration which to some extent was checked by several successful prosecutions. The Collector urged the need of a more efficient Frauds Act. The question was not solely a merchant's question. The fortune of the most valuable export in Western India was at stake. In 1872-73, 7570 acres were under American and 161,232 under local cotton. The crop was fair, there was much less adulteration than in the previous year, and the cotton came to market in fair order. In this year the efficiency of the Act was much increased by extending its working to the villages of the estate-holders or *jāgirdārs* of the Kānārese districts. Many prosecutions had broken down on the plea that the cotton had been mixed in a private or estate village.

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In 1872 an inquiry into the working of the Cotton Frauds Act of 1863 showed that in Belgaum the dealers were in favour of stronger provisions for repressing fraud. The reason why the dealers as a class were so much more in favour of penal provisions in 1872 than they had been in 1863 was that in the years between 1863 and 1872, they had lost much from frauds in cotton. The wealth which had come to the cotton-growers during the American War to a great extent had made them independent of their former patrons, the cotton-dealers. Instead of the uncleaned cotton coming into the hands of a comparatively small body of dealers and being ginned at a few centres and under their control many of the growers had set up gins and ginned and mixed the cotton before selling it to the dealers. Much when it reached Bombay was found dirty and mixed and was thrown on the dealers' hands.

In 1873-74, 7570 acres were under American and 160,622 were under local cotton. A blight seriously damaged the crop. In 1874-75, 2139 acres were under American and 175,589 under local cotton. In Bombay, American sold at 5½d. and local cotton at 4½d. the pound. The crop was large and late and there was much adulteration. *Kumta*, that is the local Belgaum cotton, was in much demand in the Bombay mills. In 1874-75 the adulteration was so great that in six cases the fraudulent mixture ranged from thirty-four to forty-seven per cent. The Collector urged Government to import fresh American seed and to take steps to check the destructive state of the saw-gins. In 1874 in consequence of an agitation in

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Bombay to put a stop to special measures for preventing cotton adulteration a Commission was appointed to consider whether a Cotton Frauds Act should be continued, and if it should be continued, what changes should be made in the existing Act.¹ The Commission collected a large amount of evidence. The majority were of opinion that though it was not advisable to annul the Act, it was advisable to place it in abeyance for a time. The report of the Commission was considered by Government and the papers were forwarded to the Secretary of State. The Secretary of State held that the majority of the evidence taken before the Commission was in favour of the continuance of the Act. Certain portions of the Act, he thought, should be modified and other portions made more stringent. He directed the Government of Bombay to prepare a fresh Act, with the object of remedying the defects of the existing measure.

In 1875-76, on account of the success of the previous year, the area under American cotton rose to 5941 acres and under local to 214,983. But the price fell and the season was not successful. Adulteration was more general than it had been for some years.

In the famine year of 1876-77 the area under American cotton fell to fifty-nine and the area under local cotton to 70,281 acres. Except in a few spots in the west what was sown failed to come to maturity, and next year the people were left almost without seed cotton.

In 1877-78, 167 acres were under American and 146,701 acres were under local cotton. Considering the losses and trials of the previous season the farmers showed wonderful energy and command of resources. Still cattle were scarce and the crop suffered much from the failure to keep it clear of weeds. Sir Richard Temple, then Governor of Bombay (1877-1880) visited Belgaum and enquired into the cause of the fall in value of the American cotton. The Cotton Department was ordered to resume the control of the gin-repairing establishments, but Government shortly afterwards decided that, for the present, operations were to be confined to Dhárwár. A supply of five hundred pounds of new American seed was ordered.

In 1878-79, 984 acres were under American and 177,374 under local cotton. The outturn of cotton suffered again from the dearness of food grains and from the want of cattle to clean the fields. These evils were small compared with the plague of rats which swarmed over Dhárwár and part of Belgaum. They attacked all crops, and to none did they do more harm than to cotton. They cut the bolls off the bushes before they were ripe, opened them and devoured the seed, leaving the unmaturing fibre strewn over the field. In some places not thirty per cent of the crop was gathered. This plague seriously reduced the already scarce supply of cotton seed. Much of the produce of the five hundred pounds of fresh American seed was destroyed. Not more than three thousand pounds were available for distribution. A second supply of 500 pounds was brought from

¹ The Commission were: The Honourable A. Rogers, President; and the Honourable E. W. Ravenscroft, the Honourable Narayen Vásudev, and Messrs. H. P. LeMesurier and E. M. Fogo, members.

America. In 1878, after long discussion, Act VII. of 1878 was passed. The provisions of this Act, though milder than those of the former Act, were more effective and they worked well. In September 1879 the Government of India recommended that all special legislation for the suppression of cotton frauds should cease. The Secretary of State did not agree with the view held by the Government of India. At the same time, on the 4th of March 1880, he sanctioned the proposals of the Government of India and desired the Bombay Government to do away with the special cotton fraud preventive establishment. According to Mr. Walton the opinion of the local European agents and native merchants was opposed to the giving up of Government efforts to check fraud.

In 1879-80, 592-acres were under American and 174,103 under local cotton. People sometimes spoke and wrote as if false packing and mixing would cease if English merchants or their agents came into the district. It was certainly less hopeless for English merchants to come to the district and buy than it had been in 1855; roads had been opened and rest-houses had been built. Still in Mr. Walton's opinion it was impossible for the exporter to buy small quantities from the growers without the help of a local dealer. In 1880 most of the cotton trade was carried on by a number of middlemen or local dealers who either went from village to village or remained in country towns and bought for their employers who were either local export merchants or the representatives of Bombay firms. Many of the local dealers instigated frauds both in cleaning and in packing in which the grower had seldom any objection to join. In spite of their losses in the famine which had reduced many of the smaller holders to their old position of dependence on the local dealer, the cotton growers were to a considerable extent independent of the local cotton-dealer or middleman. The cotton-growers knew the market price and were in a position to demand it. In Mr. Walton's opinion the chief drawback to the change was that the local dealer's profit was so reduced that he was forced to be more tricky than ever, and practised his ingenuity in devising fresh modes of cotton adulteration and false packing. The usual method of mixing local cotton is to store in a small room two heaps of cotton, a good and a bad, an old and a new, a damaged and a sound. Two men go into the room, each with a bundle of thin canes in his hand. They tie cloths over their mouths and noses and shut the door. They spread out the two kinds of cotton together and keep whipping the mixture, every now and then throwing on handfuls of seed-cotton or seed. The whipping is done with such thoroughness and skill that the mixture is surprisingly passable. Mixing with saw-gins is still easier and more perfect. The saw-gin is wilfully kept in disrepair because in that state it lets an immense weight of heavy dust and rubbish pass through powdered among the ginned cotton so as not seriously to take from its appearance. According to Mr. P. Chrystal, a Bombay merchant who is well acquainted with the Belgaum and Dhárwár cotton trade, the Bombay dealers and merchants in American Dhárwár and Kuma cotton think (1883) that the Cotton Frauds Act failed to stop adulteration in the Bombay Karnátak. Since the Act has been stopped he thinks there has been no noticeable increase in

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